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THE MONOTYPIC INDO-PACIFIC LABRID FISH GENERA *LABRICHTHYS* AND *DIPROCTACANTHUS* WITH DESCRIPTION OF A NEW RELATED GENUS, *LARABICUS*

By John E. Randall and Victor G. Springer
Bernice P. Bishop Museum, Honolulu, Hawaii 96818, and Smithsonian Institution, Washington, D.C. 20560

The wrasse genus *Labrichthys* Bleeker (1854) has been a source of confusion to ichthyologists almost from its inception. Günther (1862) erred in uniting the genus *Pseudolabrus* Bleeker with *Labrichthys*. As a result, more species of *Pseudolabrus* have been described and reported in *Labrichthys* than in the proper genus. Gill (1891) corrected this mistake, adding that Bleeker placed these two genera in different subfamilies (his Labrichthyiformes and Pseudolabriformes).

Labrichthys and its allies differ from *Pseudolabrus* (here compared only with the type-species of *Pseudolabrus*, *P. rubiginosus* = *P. japonicus*) in having five instead of six branchiostegal rays, tubes of lateral-line scales simple instead of ramose (but simple in young *Pseudolabrus*), specialized dentition, a difference in mouth structure, and a reduced, weakly ossified lower pharyngeal bone with relatively few teeth which extend uniserially onto the anterior shank of the bone (figures 1–3) as opposed to a robust, heavily ossified lower pharyngeal bone with more teeth which extend irregularly biserially, or as a patch, onto the anterior shank of the bone (figure 4). Table 1 augments the comparison of pharyngeal bones, and is based on much larger specimens than were used for the pharyngeal bone illustrations. The difference in structure of the lower pharyngeal bones is undoubtedly correlated with diet: the labrichthyiform fishes feed on relatively soft-bodied

prey; *Pseudolabrus*, based on the stomach contents of specimens we examined, include shelled molluscs in their diet.

Among the species other than those of *Pseudolabrus* attributed to *Labrichthys* are *L. bicolor* Day, a synonym of *Hemigymnus melapterus* Bleeker (as noted by Gill, 1891), "*Labrichthys* sp. one" of Harry (1953), a species of *Wetmorella*, and *L. caudovittatus* Steindachner (1898).

Although *L. caudovittatus* Steindachner (1899) has fin-ray and lateral-line scale counts comparable to *Labrichthys* and *Pseudolabrus*, it belongs in neither genus. Realizing the error in generic allocation, Smith (1957) erected *Suezia* for it. S. *caudovittatus*[1] is slender [depth 3.9 in standard length (SL)] with a short rounded caudal fin (5.3 in SL), 6 branchiostegal rays, 25 lateral-line scales with a single tube on each, 5 predorsal scales, 3 diagonal rows of scales on cheek, a fully exposed, smooth preopercular margin, a single pair of moderately straight, projecting canine teeth anteriorly in the jaws, a row of small teeth on the sides, a prominent posterior canine in upper jaw, and a long opercular flap (extending posterior to upper pectoral-fin base, 8.3 in SL).

Guichenot (1847) described a small labrid fish from Guam as *Cossyphus unilineatus*; Günther (1862) correctly referred it to *Labrichthys*. Fowler (1928) stated that this species was possibly the same as *L. cyanotaenia* Bleeker; Smith (1957) and Randall (1958) expressed the same opinion. We are now able to demonstrate that *Labrichthys unilineatus* is indeed a senior synonym of *L. cyanotaenia*.

In addition to *Labrichthys*, Bleeker described the related genera *Labroides* and *Diproctacanthus*, which he grouped in his "Labrichthyiformes." Schmidt (1930) added the genus *Labropsis* to this assemblage.

Rüppell (1835) named a small wrasse from the Red Sea *Labrus quadrilineatus*, which Günther (1862), Klunzinger (1871) and Fowler (1928) classified in *Labroides*. Estève in Roux-Estève and Fourmanoir (1955) described the same species as *Labrichthys cousteaui*. This fish does not fit in either

[1] One specimen, BM(NH) 1935.9.30.42, 93 mm SL, from Ghardaqa, Red Sea, examined at British Museum (Natural History).

TABLE 1. Comparison of lower pharyngeal bones of 123 mm SL specimens of *Pseudolabrus japonicus* and *Labrichthys unilineatus*

	Labrichthys (USNM 209180)	*Pseudolabrus* (USNM 209179)
1. Length overall:	7.2 mm	8.2 mm
2. Width overall:	6.1 mm	12.6 mm
3. Length posterior arms:	3.9 mm	6.4 mm
4. Length anterior shank:	3.7 mm	3.8 mm
5. Length tooth patch:	2.0 mm	5.9 mm
6. Width tooth patch:	1.0 mm	8.4 mm
7. Angle formed at junction of posterior arms:	approximately 70°	approximately 120°
8. Teeth on shank:	uniserial	in a patch
9. Nature of teeth:	pointed	bluntly rounded to molariform
10. Diameter of largest tooth:	approximately 0.1 mm	0.9 mm
11. Ossification:	very weak	very strong
12. General description:	thin, fragile	heavy bodied, strong

Labroides or *Labrichthys*; therefore, we propose herein a new genus, *Larabicus*, for it.

The fishes of these five genera are all small with dorsal-fin elements IX,11 or 12[2], anal-fin elements II or III,10 or 11; vertebrae 10 + 15; 5 branchiostegal rays; a continuous, abruptly curved lateral line; preopercular margin restricted and smooth (margin inapparent on *Labrichthys*); 10 or more predorsal scales; scales on thorax smaller than those on rest of body; mouth small, terminal; a prominent canine tooth posteriorly on each side of upper jaw; and distinctive lip morphology (either a bilobed lower lip or pursed fleshy lips that form a short tube when mouth is closed). Most of the species have been observed picking at the bodies of other fishes, at least as juveniles (Randall, 1958; Randall and Helfman, 1972).

In view of the close relationship of these genera, a key is presented, followed by generic descriptions of *Labrichthys*, *Larabicus*, and *Diproctacanthus* and accounts of the single species known in each of these genera. The four species of *Labroides* were treated by Randall (1958), and Springer and Smith-Vaniz (1972) discussed geographic variation in *L. dimidiatus*.

Labropsis, which consists of *manabei* Schmidt and five undescribed species, is being revised by the senior author.

Key to the Labrichthyiform Genera of Labridae

1a. Lower lip bilobed (two halves separated by a prominent U-shaped notch); body slender, the depth 3.5 to 4.4 in SL; one pair of enlarged canine teeth anteriorly in jaws ..... *Labroides*

1b. Lower lip not bilobed (lip occasionally split on *Larabicus*, as if cut by a knife, but U-shaped notch never present); body not slender, the depth 2.6 to 3.3 in SL; one or two pairs of enlarged canine teeth anteriorly in jaws (in *Diproctacanthus* the anterior canines not markedly longer than more posterior teeth) 2

2a. Anal-fin spines III; ventral part of head fully scaled except for chin 3

2b. Anal-fin spines II (some species with three spines but the tiny first spine is detectable only by dissection or from radiograph); ventral part of head naked 4

[2] The last two dorsal and anal rays are articulated to a single pterygiophore; nevertheless, they are counted as separate rays (as long as each has its own expanded basal portion).

3a. Two pairs of enlarged canine teeth anteriorly in upper jaw; no small teeth on side of upper jaw; lips thickly plicate externally; top of head scaled to nostrils; last dorsal-fin spine much shorter than posterior dorsal-fin rays; caudal fin rounded; pectoral-fin rays 14 or 15 (including rudimentary upper ray); pelvic fins of large males elongate, reaching well beyond origin of anal fin ..... *Labrichthys*

3b. One pair of enlarged canine teeth anteriorly in upper jaw; small teeth on side of upper jaw; lips faintly or not plicate externally, fringed on anterior margin; top of head scaled to posterior edge of eye; last dorsal-fin spine longer than posterior dorsal-fin rays; caudal fin truncate, becoming slightly emarginate in large males; pectoral-fin rays 13 (including rudimentary upper ray); pelvic fins not reaching anus ..... *Larabicus*, new genus

4a. No small teeth on side of upper jaw between anterior canines and posterior canine; dorsal profile of snout convex (except juveniles); length of caudal peduncle (measured horizontally from rear of anal-fin base to caudal-fin base) 1.7 to 3 in least depth of caudal peduncle ..... *Labropsis*

4b. Small canine teeth present along side of upper jaw; dorsal profile of snout straight; length of caudal peduncle 1.2 to 1.5 in least depth of caudal peduncle ..... *Diproctacanthus*

Labrichthys Bleeker

Labrichthys Bleeker, 1854. Nat. Tijdschr. Ned.-Indië, 6:331 (type-species: *Labrichthys cyanotaenia* Bleeker, by monotypy).

Thysanocheilus Kner, 1864. Anz. Akad. Wiss. Wien, 1:185 (type-species: *Thysanocheilus ornatus* Kner by monotypy).

Description: Body moderately elongate, depth 2.6 to 3.2 in SL; body compressed, width behind gill opening 2.2 to 2.7 in depth; head length 2.4 to 2.8 in SL; caudal peduncle deep, least depth 1.7 to 2.2 in head; length of caudal peduncle (measured horizontally from rear of anal-fin base to caudal-fin base) 2.1 to 2.6 in least depth of caudal peduncle; snout moderately pointed, 2.8 to 3.3 in head; eye 1.0 (26.5-mm specimen) to 2.4 in snout; lips thick, fleshy, strongly plicate externally as well as internally; lips form short tube when mouth is closed; thin epidermal sheath from front of snout partially covering upper lip; two pairs of well-separated, incurved canine teeth at front of upper jaw and large canine tooth at posterior end of jaw on each side, but no intervening teeth; pair of close-set, moderately straight, stout canines at front of lower jaw, followed by row of 3–5 small teeth on side of jaw (one specimen lacked these teeth on one side of jaw); dorsal fin IX,11 (rarely 12); anal fin III,10 (rarely 11); branched caudal-fin rays 12; pectoral-fin rays 14 or 15 (usually 14); lateral-line scales 26 (rarely 25 or 27) (plus 2 scales posterior to end of hypural); head entirely scaled except for sheath over base of upper lip, preorbital, and chin (scales on head

of variable size, the largest on opercle nearly as large as scales on body; scales anteriorly on head small, about 18 rows across interorbital); preopercular margin usually scaled over; basal half or more of median fins scaled (except posterior part of dorsal and anal fins where less than half is scaled); caudal fin rounded, 1.3 to 2 in head; dorsal-fin spines progressively longer posteriorly, ninth spine 2.8 to 3.6 in head; dorsal- and anal-fin soft rays also progressively longer, last fin rays 1.6 to 3 in head (spines and rays relatively longer in adults); pectoral fin short, rounded, longest ray 1.8 to 2.2 in head; pelvic fins variable, short in juveniles and females, very long in adult males (longest pelvic-fin ray half or more of SL); gill membranes broadly attached to isthmus; cleft between membranes short, not extending anteriorly beyond level of postorbital margin (cleft hidden by overlying scales for most of its length); gill-rakers small, 9 or 10, all on lower limb; vertebrae 10 + 15.

Labrichthys unilineatus (Guichenot)
Figs. 1, 5, 8,

Cossyphus unilineatus Guichenot, 1847. Rev. Zool. Soc. Cuvierienne, p. 284 (type-locality: Guam).

Labrichthys cyanotaenia Bleeker, 1854. Nat. Tijds. Ned-Indië, 6:331 (type-locality: Larantuka, Flores).

Thysanocheilus ornatus Kner, 1865. Akad. Wiss. Wien, Denk., 24(1): 5, pl. 3 (type-locality: Upolu, Samoa).

Chaerojulis castaneus Kner and Steindachner, 1867. Akad. Wiss. Wien, Sitz., 54:393, figs. a, b (mouth) and pl. 2, fig. 8 (type-locality: Samoa Islands).

Description: Characters of the genus. Life colors as follows: small juveniles (such as Fig. 8a) brown, with light bluish reflections on scales, especially on head, anteriorly on body and over thorax and abdomen; two narrow bluish white stripes on body, the most conspicuous stripe passing from snout through lower edge of eye and ending in middle of caudal fin, the second stripe from chin across thorax below pectoral fin to ventral caudal-fin base; faint pale longitudinal banding on body following centers of scale rows; median fins edged in clear light blue, broadest anteriorly on soft portions of dorsal and anal fins and at corners of caudal fin; mouth region faintly yellowish; caudal fin slightly yellowish basally.

Larger individuals lack the lower stripe; the mid-lateral stripe be-

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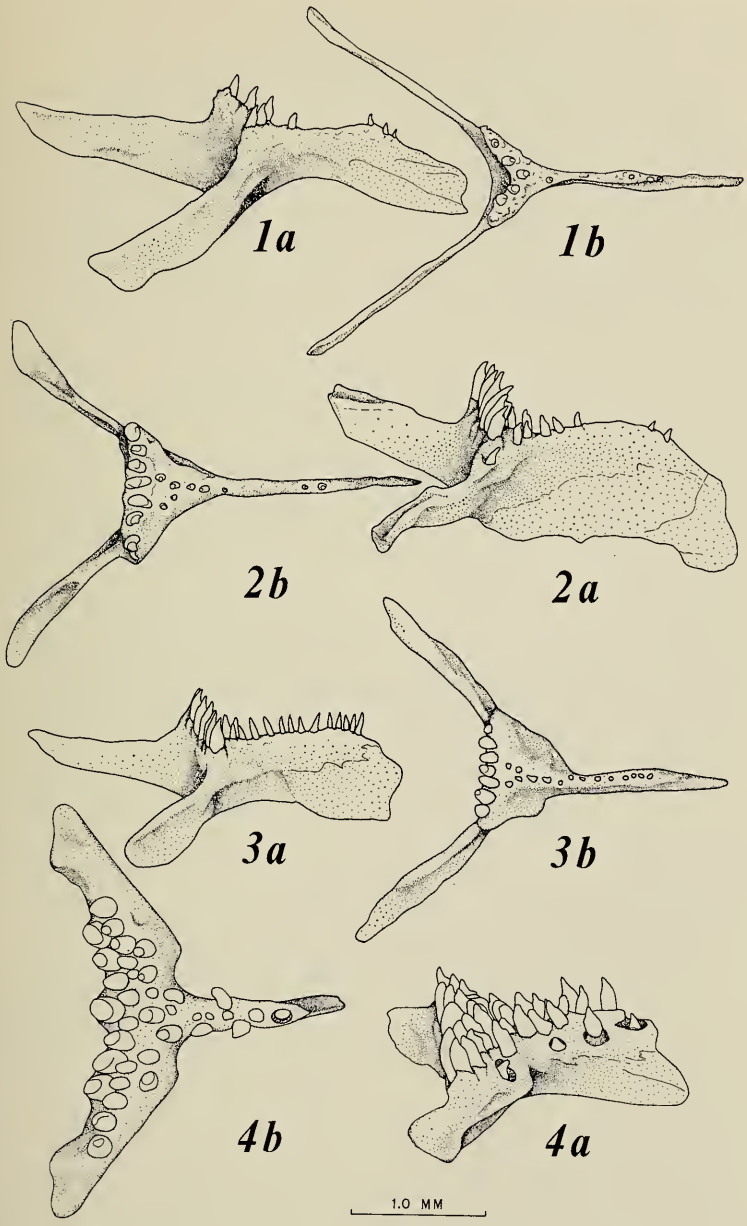
Figs. 1–4. Lower pharyngeal bones; a, lateral views; b, dorsal views. Fig. 1. *Labrichthys unilineatus*, female, 53 mm SL, USNM 208451; Fig. 2. *Larabicus quadrilineatus*, female, 52 mm SL, USNM 208452; Fig. 3. *Diproctacanthus xanthurus*, female, 46 mm SL, USNM 208453; Fig. 4. *Pseudolabrus japonicus*, juvenile, 38 mm SL, USNM 208589.


1a
1b
2b
2a
3a
3b
4b
4a
1.0 MM

comes light yellowish and the mouth more yellow. Still larger fish lose the lateral stripe.

70 mm female (Fig. 8b): yellowish brown with faint, dull blue, longitudinal lines along centers of scale rows; irregular faint blue bands on head, most prominent band passing from corner of mouth to eye; caudal fin dull yellowish brown with pale bluish border and narrow dark brown sub-marginal zone; curved bluish band faintly visible on outer third of caudal fin paralleling posterior margin; dorsal and anal fins similarly colored, with bluish band, partially broken into spots, about half way out in rayed portion of fins; pectoral fins hyaline with pale bluish rays and large dark brown spot at base followed by yellow zone; pelvic fins brownish yellow with two faint longitudinal light bluish streaks; lips primarily yellow.

The 67-mm male (Fig. 8c) displayed intensification and brightening of narrow blue stripes on body and blue bands on head (which have broadened to form a coarse reticulum); large yellow area evident beneath and above pectoral fins; margins of median fins bright blue; most of central and basal part of caudal fin and basal parts of dorsal and anal fins irregularly marked with blue; proximal yellow zone on pectoral fins next to basal dark brown spot broader and deeper in hue than in female; pelvic fins yellowish brown with lateral blue edge and median blue streak; yellow of lips reduced.

94-mm male (Truk, Caroline Islands, BPBM 7495): dark olive with longitudinal, bright blue lines on body; blue markings (broader anteriorly) on head; diffuse yellow bar extending dorsally from beneath pectoral fins; median and pelvic fins edged in bright blue; outer third of caudal fin with curved band composed of linked hemispherical segments of blue; pelvic-fin base dark brown; pelvic fins bright yellow proximally and clear distally.

Remarks: Guichenot described *unilineatus* from two small specimens (the length of only one specimen was given: a little more than 6 cm) with a single mid-lateral pale stripe. The type-specimens were not located; they are not listed in Bauchot's (1953) catalogue of labrid types in the Museum National d'Histoire Naturelle, and she informs us that a recent (1972) search of the collections did not uncover them.

The holotype of *Labrichthys cyanotaenia* Bleeker was not found by us. No specimens of the genus *Labrichthys* are present in the Rijksmuseum van Naturlijke Historie at Leiden. One specimen attributed to Bleeker was examined at the British Museum (Natural History); this

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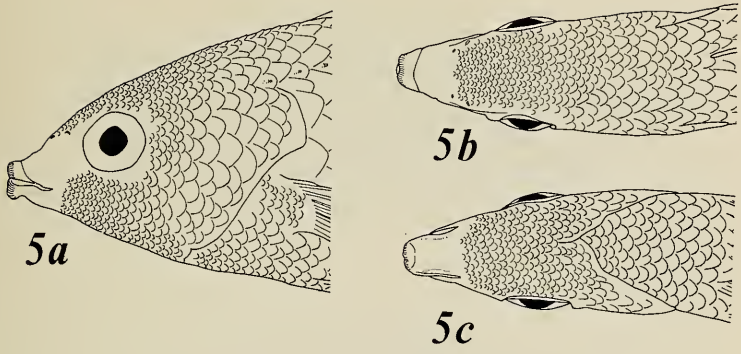
Figs. 5–7. Head topography; a, lateral views; b, dorsal views; c, ventral views. Fig. 5. *Labrichthys unilineatus*, 51 mm SL, USNM 117706; Fig. 6. *Larabicus quadrilineatus*, 50 mm SL, USNM 208452; Fig. 7. *Diproctacanthus xanthurus*, 50 mm SL, USNM 207468.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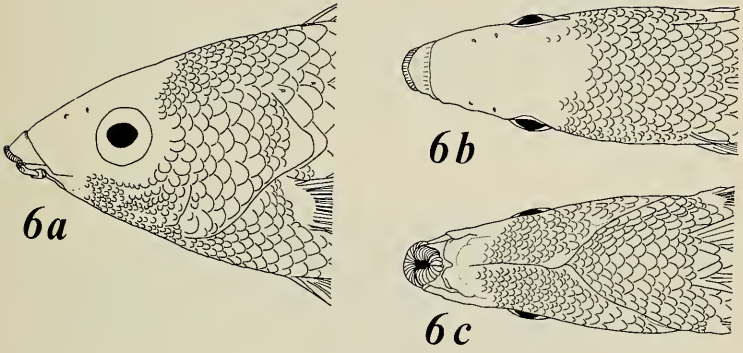
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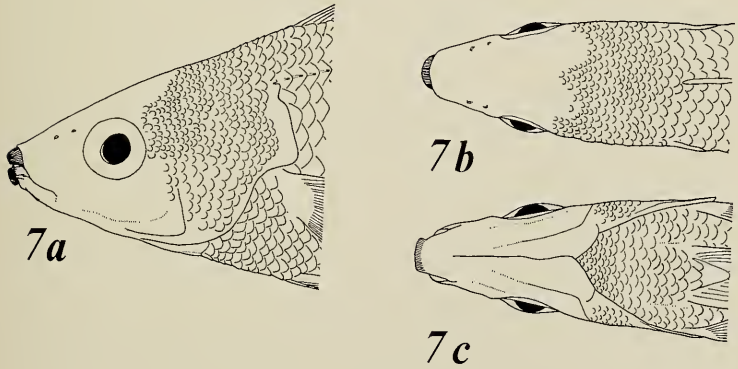
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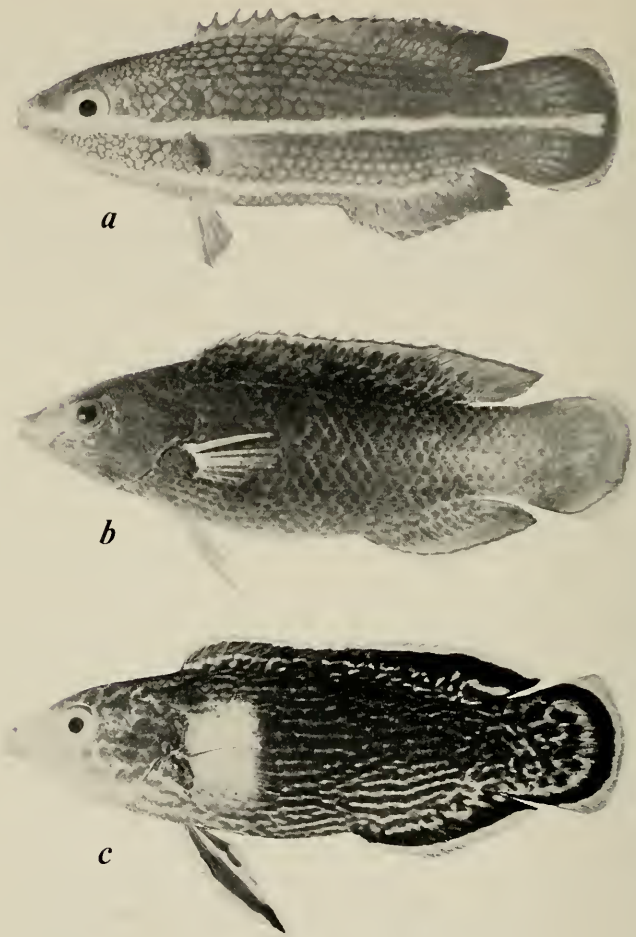

FIG. 8. *Labrichthys unilineatus.* a, juvenile, 31 mm SL, Upolu, Western Samoa, BPBM 6162; b, female, 70 mm SL, Tutuila, American Samoa, BPBM 11305; c, male, 67 mm SL, Tutuila, American Samoa, BPBM 6161.

fish, No. 1864.5.15.38, 64 mm SL and 82.5 mm TL, could not have been Bleeker's type, which was 128 mm long.

A syntype of *Thysanocheilus ornatus* Kner from Samoa was examined in the British Museum (Natural History), No. 1865.5.29.16. It measures 125 mm SL and is clearly a large male *unilineatus*. There is a broad pale bar running dorsally from beneath the pectoral fin; the pelvic fins

are 61 mm long. We here designate this syntype as lectotype of *T. ornatus*.

Some authors have placed *Platyglossus ocellatus* Kner and Steindachner in the synonymy of *Labrichthys cyanotaenia* (= *unilineatus*). de Beaufort (1940) noted that this resulted from a mistake in ascribing Fig. 8 (a recognizable drawing of *unilineatus*) to *Platyglossus ocellatus*. *Chaerojulis castaneus* Kner and Steindachner is the correct junior synonym.

Fowler (1928) placed *Labrichthys australis* Steindachner (1866) in the synonymy of *L. cyanotaenia* (= *unilineatus*); however, it is evident from Steindachner's description that *australis* is not a *Labrichthys*.

We have collected *L. unilineatus* in the Ryukyu Islands, Mariana Islands, Caroline Islands, Gilbert Islands, Samoa Islands, southern Molucca Islands, One Tree Island (Capricorn Group, Great Barrier Reef) and Lord Howe Island. We have examined, in addition, museum specimens from Kenya, Zanzibar, Indonesia, New Guinea, Philippines, Palau Islands, New Caledonia, and the Marshall Islands. Smith (1955) recorded the species from Aldabra; Smith (1957) reported it from Malindi (3°S) to Bazaruto (21°S) in East Africa, adding that it is rare; and Herre (1931, 1936) recorded it from the Solomon Islands. There is no record from the Red Sea (where the junior author made numerous collections and observations). Nearly 2 years of field work by the senior author in French Polynesia have failed to turn up any specimens, thus the record from Tahiti by Fowler (1931) (after Pohl) is questionable. Also, this species was not observed or collected in the Line Islands, Cook Islands, or islands of the Pitcairn Group. It seems likely that it does not range to the east of the Samoa Islands.

The largest specimen we have examined is 135 mm SL. It was collected by E. Postel in New Caledonia and was deposited in the Museum National d'Histoire Naturelle under number 1964–309. The pelvic fins measure a remarkable 74.6 mm in length.

Labrichthys unilineatus is usually seen in shallow lagoon reefs. Our specimens have come from a depth range of 0.7 to 15 meters, though the species probably ranges into somewhat deeper water. We have seen it most often swimming agily through thickets of staghorn coral (*Acropora*). Large males have been observed in courtship with drab brown females. In Samoa we observed this fish frequently picking at several species of live coral, including two of *Acropora*; thus it appears to feed on coral polyps. We have not seen it clean other fishes, but our observations have been limited. In view of the occasional cleaning by related genera, it would not be surprising if juvenile *Labrichthys*, at least, are part-time cleaners.

Larabicus, new genus

Description: Body moderately elongate, depth 2.9–3.3 in SL; body compressed, width 1.8 to 2.3 in depth; head length 2.6 to 2.9 in SL;

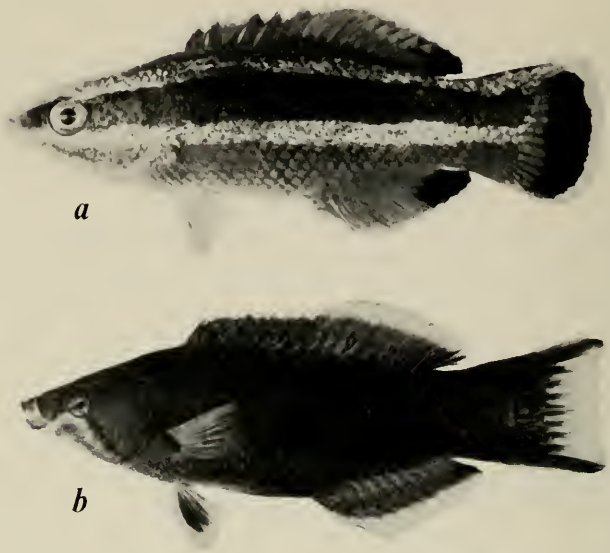

Fig. 9. *Larabicus quadrilineatus*, Gulf of Aqaba, Red Sea. a, juvenile, 31 mm SL, BPBM 13385; b, male, 88 mm SL, BPBM 13400.

caudal peduncle deep, least depth 1.8 to 2.2 in head; length of caudal peduncle 1.7 to 2.4 in least depth of caudal peduncle; snout pointed, 2.7 to 3.4. in head; eye 1.3 (31-mm specimen) to 2.4 in snout; lips thick, fleshy, strongly plicate internally, smooth to faintly plicate externally with fringed area at anterior margin; lips form short tube when mouth is closed; anterior part of lower lip curves ventrally; no sheath from front of snout covering part of upper lip anterior to frenum; single pair of enlarged incurved canine teeth at front of upper jaw, followed by close-set, small, slender canines along side of jaw (in about three irregular rows anteriorly); lower jaw with one pair of enlarged, slightly incurved, canine teeth anteriorly, followed by close-set, small canines along side of jaw (in two irregular rows anteriorly); dorsal fin IX,11; anal fin III,10; branched caudal-fin rays 12; pectoral-fin rays 13; lateral-line scales 26 or 27 (plus 1 or 2 scales posterior to end of hypural); head scaled dorsally to posterior interorbital space, ventrally to just behind corner of mouth; largest head scales (on opercle) noticeably smaller than largest body scales; scales anteriorly on head much smaller than other head scales; preopercular margin free over broadly rounded angle and for short distance above; scales covering approximately basal third of dorsal and anal fins and basal half of caudal fin; caudal fin truncate, slightly emarginate in adult males, 1.3 to 1.9 in head; dorsal-fin spines progressively longer posteriorly, the ninth spine 2.8 to 4.3

FIG. 10. *Diproctacanthus xanthurus*, Palau Islands. a, juvenile, 27 mm SL, BPBM 9562; b, male, 62 mm SL, BPBM 6385.

in head; anterior dorsal- and anal-fin soft rays longer than posterior rays; last vertical-fin rays 3.6 to 5.3 in head; pectoral fin short, rounded, longest ray 2 to 2.3 in head; pelvic fins short, 2 to 2.4 in head; gill membranes broadly attached to the isthmus; cleft between gill membranes extending anteriorly to or beyond level of mid-orbit; gill-rakers small, 11 to 13, all on lower limb; vertebrae 10 + 15.

Monotypic, type-species, *Labrus quadrilineatus* Rüppell (1835).

Etymology: An arbitrary combination of letters; gender, masculine.

Larabicus quadrilineatus (Rüppell)
Figs. 2, 6, 9

Labrus quadrilineatus Rüppell, 1835. Neue Wirbel. Fauna Abyssinien, p. 6, pl. 2, fig. 1 (type-locality, Massaua, Red Sea).

Labrichthys cousteaui Estève in Roux-Estève and Fourmanoir, 1955. Ann. Inst. Oceanogr. Paris, N.S., 30:199 (type-locality, Abulat, Red Sea).

Description: Characters of the genus. Life color as follows: Juvenile (of Fig. 9a) dark purplish gray with two brilliant blue stripes, the upper stripe passing from front of snout through upper edge of eye to upper edge of caudal fin, the lower stripe from chin through lower edge of eye across upper pectoral-fin base to middle of caudal fin (upper edge of lower stripe along mid-side of body); zone of dark purplish-gray ground

color between blue stripes about twice as wide as each blue stripe; ventral part of head blue; each scale of thorax and abdomen with broad basal bluish area; scaled basal part of caudal fin colored like body, the two stripes in fin interconnected with indistinct vertical blue band; less distinct band running ventrally from caudal end of lower stripe; unscaled part of caudal fin with large, vertically elongate, black area; posterior margin of fin whitish; dorsal and anal fins dusky, the scaled basal part of each fin darker, with large black area posteriorly (covering most of last five interradial membranes of anal fin and last three interradial membranes of dorsal fin); margins of dorsal and anal fins whitish—more evident on soft portions; pectoral fins pale, black at base; pelvic fins bluish white with large central dusky region.

Females retain the two blue stripes but have the black area posteriorly in the median fins reduced; a large black spot is developed on each interspinous membrane of the dorsal fin between the second and fifth spines (some dark pigment may extend onto the sixth membrane).

Large male (of Fig. 9b) dark purplish gray without stripes; curved light blue band extends from chin to eye, continuing posteroventrally in direction of isthmus; abdomen light bluish ventrally; scaled basal portion and upper and lower caudal-fin lobes dark purplish gray except for narrow, indistinct blue margins on upper and lower edges; caudal fin with large crescentic pale area posteriorly, the membranes of which are blue proximally, whitish distally, rays dark purplish proximally, becoming whitish distally; dorsal and anal fins dark purplish with broad blue margins (one-fourth to one-third height of soft portions of fins) shading to whitish distally; black area on membranes between third and sixth dorsal-fin spines, some pigment extending onto second membrane; pectoral fins pale, black at base pelvic fins blue with large centrobasal area dark purplish (most intense on second interradial membrane); basal part of upper lip bluish, fringed margins of both lips whitish.

Remarks: Wolfgang Klausewitz has informed us that the holotype of *Labrus quadrilineatus*, which was once housed in the Senckenberg Museum, Frankfurt, has been lost.

The holotype (No. 52–254, 64 mm SL) and three paratypes of *Labrichthys cousteaui* Estève from the Red Sea were examined at the Muséum National d'Histoire Naturelle. These specimens are examples of *quadrilineatus* Rüppell.

The authors have collected specimens of *quadrilineatus* in the Red Sea from Elat, northern end of the Gulf of Aqaba, to Massawa, Ethiopia, in depths from 2 to 7 meters, and have observed individuals at depths up to 32 meters. All specimens that we have seen have come from the Red Sea, except one (USNM 209719) from Aden, near the entrance to the Red Sea.

Lev Fishelson, University of Tel Aviv, and David Fridman, Elat, (personal communication) have observed the young of *quadrilineatus* picking at the bodies of other fishes. Abel (1960) reported that *L. quadril-*

ineatus is an occasional fish "cleaner" but feeds mostly on coral polyps. He observed one group of 10 fish of this species living among the low branches of a violet *Acropora*. These fish grazed about two-thirds of a square meter of coral in 4 weeks. The damaged area could be recognized by its white color. The tips of the coral were spared the longest.

The dark form of *L. quadrilineatus* was positively linked to the smaller, two-striped phase when the senior author observed a large male in courtship with a presumed blue-striped female at 32 meters off Coral Island, Gulf of Aqaba. We have mature females as small as 43 mm SL. Our largest specimen of *quadrilineatus* is a male, 90.8 mm SL (USNM 208450).

Diproctacanthus Bleeker

Diproctacanthus Bleeker, 1861. Proc. Zool. Soc., p. 415 (type-species: *Labroides xanthurus* Bleeker, by original designation).

Description: Body moderately elongate, the depth 3.1 to 3.7 in SL; body compressed, width behind gill opening 2.0 to 2.3 in depth; caudal peduncle moderately slender, the least depth 2.3 to 2.7 in head; length of caudal peduncle 1.2 to 1.5 in least depth of caudal peduncle; snout pointed, 3.2 to 3.6 in head, dorsal profile straight; eye 1.0 to 1.6 in snout; lips thick, fleshy, strongly plicate internally and externally, forming short tube when mouth closed; sheath at front of snout covering part of upper lip anterior to frenum; two pairs of enlarged, slightly incurved canine teeth at front of upper jaw, the anterior pair largest; two to seven smaller teeth along side of upper jaw, the anteriormost teeth not markedly smaller than second pair of anterior canines; two pairs of small canines medial to large anterior canines; large canine tooth posteriorly on upper jaw; lower jaw with pair of enlarged, slightly incurved canine teeth anteriorly in jaw, followed by five or six progressively smaller teeth on side of jaw; another row of two or three small teeth medial and just posterior to large anterior canines; dorsal fin IX,9 or 10 (usually 10); anal fin II,9 or 10 (usually 9); branched caudal-fin rays 12; pectoral-fin rays 12 to 14 (including rudimentary upper ray); lateral-line scales 34 to 39 (plus two posterior to end of hypural); apex of V-shaped area of scales on nape reaching nearly to a vertical at posterior edge of eye; postorbital region of head scaled ventrally to about level of lower pectoral-fin base; scales on cheek reaching to, or slightly anterior to, vertical at center of eye; head scales small, the largest scales on opercle less than half size of largest body scales; approximately upper half of vertical margin of preopercle scaled over; dorsal and ventralmost rows of body scales encroaching slightly on bases of dorsal and anal fins; caudal fin rounded to truncate, 1.5 to 1.7 in head length; dorsal-fin spines progressively longer posteriorly, the ninth spine 3.3 to 4.5 in head; anterior dorsal and anal-fin rays longer than posterior rays, the posteriormost rays 4.8 to 5.4 in head; pectoral fins rounded, short, longest ray 2.2 to 2.5 in

head; pelvic fins short, 2.1 to 2.5 in head; gill membranes broadly attached to isthmus, the cleft between membranes extending anteriorly beyond level of anterior orbital margin; gill rakers small, 6 to 8, all on lower limb, vertebrae 10 + 15.

Diproctacanthus xanthurus (Bleeker)
Figs. 3, 7, 10

Labroides xanthurus Bleeker, 1856. Acta Soc. Sci. Indo-Neerl., 1:52 (type-locality, Manado, Celebes).

Description: Characters of the genus. Life color as follows: juveniles with three broad, black stripes extending from anterior of head to caudal fin where stripes merge; intervening narrower stripes on head and body white; caudal fin black with upper and lower edges narrowly bluish white and corners hyaline light blue; dorsal and anal fins black basally, shading to hyaline light blue distally; pectoral fins hyaline; pelvic fins bluish white; lips light bluish and black.

With growth, a suffusion of yellow appears over the black of the caudal fin; with further growth, the fin becomes entirely yellow, the lower black stripe on head and body disappears, and the upper stripe is less distinct.

62-mm male (Fig. 10b): blackish stripe passing from lips through eye across full width of opercular flap to caudal base slightly above mid-side, the stripe darkest on opercular flap (light bluish margin along stripe present on flap); dusky olivaceous mid-dorsal stripe passing from front of snout to upper caudal peduncle; narrow band between two black stripes (which contains anterior part of lateral line) greenish white; head and body below lateral black stripe white except for light salmon streak running from chin along lower side of head, and scant dusky pigment on scales of first two scale rows below lateral stripe; dorsal fin light greenish; remaining fins whitish.

Remarks: Bleeker had two syntypes, 39 and 62 mm TL. A specimen in the British Museum (Natural History) labelled as a type is probably the smaller of the two syntypes. This fish, BM(NH) 1864.5.15.17, 31 mm SL, has the juvenile pattern of three broad black stripes. The second syntype seems to be the larger of two Bleeker specimens in the Rijksmuseum van Naturlijke Museum at Leiden (RMHN 6544, 47 mm SL, 60 mm TL). The damaged fin rays and cut gill membranes on one side suggest that it has been well studied. A printed strip above the main label reads "144 *Diproctacanthus xanthurus*," and a piece of old red tape on the jar may have indicated a type. This fish has the adult color pattern (as figured by Bleeker in his *Atlas Ichthyologique*, 1862, vol. 1, pl. 21, fig. 2). It is here designated the lectotype.

In addition to Bleeker's types, *D. xanthurus* is known in the literature from Ambon (de Beaufort, 1913), Teomabal Island, Philippines (Fowler and Bean, 1928), and the Palau Islands (Randall and Helfman, 1972). We here record it from Madang Harbor, New Guinea from a 49-mm

specimen (USNM 207468) collected by Bruce B. Collette, from Ambon and Ceram, based on specimens we collected, and from Java from specimens at the Senckenberg Museum, Frankfurt (SMF 9516, 4:34–52 mm SL; SMF 3792, 8:31–52.5 mm SL).

In Palau *D. xanthurus* occurs in lagoons, most commonly at 2 to 3 meters depth, where the bottom is mainly coral. Randall and Helfman (1972) reported that this fish feeds in part on coral polyps and in part on the ectoparasites of other fishes. In contrast to species of *Labroides*, which tend to occupy relatively restricted sectors of reefs for cleaning, *D. xanthurus* is more of a rover. As a result, it services mainly territorial fishes such as the pomacentrids that are less apt to seek out cleaning stations.

The largest known specimen is the one from the Philippines recorded by Fowler and Bean; they gave the length as 97 mm TL. Randall and Helfman reported a ripe female 43 mm SL.

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